



CUT YOUR POWER BILL BY £100!

Using electronics more responsibly in your home can not only help save the planet, it can help save you a fortune on electricity bills. Julian Prokaza reveals a few home truths

The increasing concern about the state of the planet and the part we play is causing the electronics industry to rethink its practices. Manufacturers are going to great lengths to secure greener credentials for everything from processors to packing cases. When a hip company such as Apple starts using its environmentally friendly practices as part of its marketing, it's clear that a trend is being set.

However, there's more to saving the world than making sure new products are manufactured in a responsible way. Our existing electronics, and how we use them, can also play a part. Even if you are not convinced about your contribution to climate change, paying closer attention to how you use your gadgets will save you something else – money.

Obviously it costs money to run or recharge anything from the mains power supply, but that's only part of it. You may be happy to pay for the privilege of using a PC, laser printer, television or DVD player for several hours each day, but should you be paying for them to sit idle the rest of the time? The standby mode of many devices does little more than curtail external signs of activity while leaving the internals to draw almost as much power. The question is: what practical steps can you take to fix this?

The simple option is to turn off an electronic device at the mains when it's not in use. Unfortunately, it's not so easy in practice when certain devices such as video recorders need to turn themselves on at certain times. A more viable option is to establish just how much it costs to run your key power consumers when they're not being actively used, then ensure that they stay in their lowest power state for as long as possible. In this feature, we'll show you how you can do this.

TESTING AND CALCULATIONS

Unless you're in the enviable position of not having to worry about your utility bills, it's good financial sense to ensure you're getting the best value out of your energy consumption. Luckily, when it comes to electricity, this is easily done. A £10 gadget that sits between the mains supply and an electrical device can, in a few seconds, tell you how much power that device uses in its active state. It can also show the effect of any power-saving measures.

For the purposes of this feature we used a power plug monitor, available for £9.95 including VAT from Maplin

Electronics. This isn't a scientific instrument that can measure power consumption down to the nearest nanowatt, but its accuracy is more than sufficient for home use. This particular model can measure a variety of units, but the one of interest to us is the watt hour.

The watt (W) is the standard derived unit of power. In essence, it's a measure of how much energy a device consumes when it is working. A watt hour is the number of watts consumed each hour by, in our case, an electrical device. For example, a 100W light bulb is so termed because it draws 100 watts over one hour. If you know how many watt hours a device consumes, multiplying it by 1,000 gives its kilowatt hour rating. Armed with this information, you can then calculate how much the device costs to run, since all utility companies charge by the kilowatt hour (kWh). They usually refer to one kWh as a unit.

At the time of writing, the lowest priced electricity cost 11.087p for the first 900kWh (900 units), then 7.036p for the rest. So if our 100W light bulb is left running for six hours a day, that equates to $100 \times 6 = 600\text{Wh}$ a day, or 0.6kWh. At a cost of 11.087p per kWh, that means that

PRICE CALCULATIONS

All utility companies use a two-tiered charging system. For our calculations, we used:

- 11.087p including VAT for the first 900 units (900kWh)
- 7.036p including VAT per unit thereafter



DESKTOP PC



Off	3W
Idle	78W
Working	Up to 150W
Standby (S1)	59W
Standby (S3)	3W
Typical cost per year	£24.53

The desktop PC is perhaps the single greatest offender when it comes to wasting electricity. No-one in their right mind would consider leaving the TV on when they go to work or to bed, yet computers are routinely left running purely so we don't have to wait a short while for them to boot the next time they are needed. As if this wasn't bad enough, monitors are usually left running, too. While screensavers may protect against image burn-in on older CRT monitors, they consume even more power.

A typical PC draws around 78W, so costs around £22.50 a year to run if it's turned off at the end of each working day. If the computer is left running for 24 hours a day, five days a week, that cost rises to £75.76 a year. The 78W figure is for the PC running a couple of office applications and a web browser. This can rise to 150W when the computer is running games, increasing the cost to run accordingly. These costs don't include running a monitor, which we cover separately on the following page.

If you want to reduce PC running costs, the easiest way is to shut down the computer at the end of each day. It'll still be drawing a little power in this state (around 3W), however, so turn it off at the mains if you want it to draw zero. If you'd prefer not to wait while the computer shuts down and starts up each day, put it in hibernate or standby mode. Our computer drew the same 3W in both states but hibernate, while slower to recover, has the added advantage of ensuring that you don't lose your work if you turn off the power at the mains.

It's also worth setting a PC's hard disks to spin down after a few minutes' inactivity. You'll save around 6W per hard disk that way when the computer is left running. Just remember to close applications that auto-save documents, or webpages that auto-refresh, since they'll make the hard disk spin up each time.

You should also check your PC's BIOS to see which power-saving mode it is using. There are two power-saving modes: S1 and S3. S1 stops the processor while still supplying power to the other components. Our computer still drew 59W in S1 standby mode, which is £40 a year if you put it in standby at the end of each day. S3, however, saves the system state in RAM and cuts the power to most components. Our computer's consumption dropped to just 3W in this state, which would cost just £2 a year.

Peek through any office window late at night, and the chances are that most PCs and monitors have been left on or are running a

screensaver. Screensavers use no less power than any other application, and simple 3D ones can actually use more. For example, the Windows 3D Flowers screensaver caused our mid-range PC to draw up to 120W thanks to its use of the 3D graphics chip. Don't forget the monitor is still running, too, which uses even more power.

The combined cost of leaving a PC and 17in LCD running for 24 hours a day, seven days a week, is around £145 a year. Enable standby mode on the PC and monitor, and this figure drops to £35 a year, which is a saving of around £110. If you have more than one computer in your home and you leave them all on, it's easy to see how you could save a small fortune.

LAPTOP PC



Off & charging	32W
Standby & charging	35W
On & charging	64W
Off	2W
Standby	3W
On	32W
Typical cost per year	£10.58

Since laptop PCs use components that are frugal by design, it stands to reason that they should use less power than their desktop counterparts. They can also run off battery power rather than the mains. However, this isn't free energy because the battery does have to be recharged at some point.

When fully charged, our Core Duo laptop had a power draw of 32W when idle with the same applications open as on our desktop PC. This dropped to 3W in standby mode, and 2W when shut down. With the battery charging, the laptop had a draw of 64W when idle, 35W in standby and 32W when shut down.

These idle-time figures also include the power draw for the display, which is something you'll need to add on to the desktop PC results if you want to make a direct comparison. The On and On/Charging figures (32W/64W) were also measured with the display set at mid-brightness. They rose to 34W/67W at full brightness.

If used on mains power only, our laptop costs £9.22 a year when used actively, and £1.36 to leave plugged in and turned off the rest of the time, which comes to £10.58 in total. That's around one third of the cost of running a desktop PC with an LCD monitor.

If you repeatedly use the laptop on battery power and then continue to use it while recharging (assuming three-and-a-half hours and 90 minutes of usage time respectively) for a working day, and put it in hibernate mode when you are done, that would work out at £16.83 a year, which is still half the running costs of a desktop PC.

When it comes to cutting power consumption on a laptop, the same advice

the bulb costs almost 7p a day to run, which is around £24 a year.

When working out the cost per year to run equipment that is in active use only when you are sat in front of it, we have assumed a usage period of 10 hours a day, five days a week. That means a PC is in active use for 2,600 hours a year, and idle for 6,160 hours.

The figures that we are quoting here are solely for individual pieces of equipment. However, they can easily be scaled up if you want an idea of how much energy an office with 10 PCs is wasting. An increase in the number of power-consuming devices has other implications, though, and they too have a cost.

All electrical equipment generates heat.

Anything from light bulbs to PCs and photocopiers emit heat, and the longer each piece of equipment is left running, the more heat it generates. As a result, most office buildings need to be cooled if they are to remain at a comfortable temperature during the day. However, air conditioning is usually turned off at night to save money. If the PCs are left on then that heat is still being generated and will build up overnight, which means that the air conditioning will have much more work to do when it comes back on the following day. This costs businesses even more money.



MAKING A GREENER HOME

applies as for desktops. However, laptop components, particularly the processor, are more likely to offer their own power-saving features, so make sure that they are enabled.

LCD MONITORS



Off 1W
Standby 1W
On, mid-brightness 29W
Typical cost per year £8.75

The amount of power used by a monitor depends on three things: its type, size and brightness. CRT monitors are the biggest power hogs, and a 17in model can consume anything up to 80W in active use. LCD displays are far more frugal. Our 17in Samsung SyncMaster 171P drew just 29W. That's a saving of £15 a year over the cost of running a CRT.

Since they use a larger backlight, larger LCD monitors use more power. However, when we tested a 22in Dell widescreen display, we found that it actually drew less power than the Samsung, both in normal use and in standby mode, and for a good reason. The Samsung monitor we tested was five years old, while the Dell was brand new. Great strides have been made in power efficiency over the intervening years, and as a result a larger, new monitor is cheaper to run than an older, smaller one, even if it is by just a few pence.

Perhaps more surprising is the difference a monitor's brightness can make to power consumption. The values listed here are all for a 50 per cent brightness setting, but at its highest setting the 22in Dell's draw shot up to 44W. At its lowest it plummeted to 20W – a difference of nearly £7 a year between the two settings. If you're running your monitor at full brightness then dropping it to 50 per cent, or at the very least calibrating it properly, can save a fair few quid each year.

As noted in our Desktop PC section, you should ditch the screensavers. Set your monitor to go into standby mode, and you'll save a packet.

PRINTERS



Inkjet (in use/standby) Varies/3W
Laser (in use/standby) Varies/6W

The power consumption of a printer varies wildly between different models. However, one thing is certain: laser printers use more power than inkjets.

When printing from cold, an A4 laser printer can draw up to 700W as it heats the fuser in readiness for bonding powdered toner to printed pages. It then charges the drum and scans it with a laser beam for each print. Thanks to their simpler printing mechanism, inkjets use far less power when printing, consuming anything from 10W to 30W for most A4 colour

models. Neither type of printer is active all the time, of course, but standby modes for both are still relatively high, at around 6W for a laser printer and 3W for an inkjet.

Given that there's very little crossover in the applications to which laser and inkjet printers are best suited, there's not much point in trying to establish which is the most power-efficient printer. Laser printers are usually much faster at printing text than inkjets, but given their greater power consumption you'll need to be printing an awful lot of pages to make a laser printer cheaper to run.

Apart from buying a model with a low-power standby mode, or simply turning it off when you're not using it, there are no direct steps you can take to cut a printer's power consumption, but there are some roundabout solutions. Laser printers are cheaper to run than inkjets when it comes to toner and ink costs, but in both cases the best way to save money is to print only those documents for which you really need a paper copy. For example, rather than print receipts from online stores, you could install the free Pdf995 PDF creator (www.pdf995.com), then print documents to PDF files and save them to your computer for reference.

Dropping the print resolution won't make much difference to power consumption, but it will make pages quicker to print and make your ink or toner last longer. You probably won't be able to spot any difference in quality between high- and draft-quality text documents. It's also a good idea to enable any ink- or toner-saving modes for the bulk of prints, too.

Finally, enabling a printer's duplex mode to print on both sides of a page will certainly cut down on paper consumption, but since the printer is still printing the same number of pages it won't cut power consumption, and the more convoluted paper path may mean that it actually uses more power.

Closing Windows Power saving in Vista

For all its faults, Windows Vista does offer one or two improvements over its predecessor, and power management is one area where some big changes have been made. 'Turn off computer' is no longer the most obvious option on the Start menu. Instead, there's a large red off button. Clicking this doesn't shut down Windows and turn off the PC, though – rather, it puts Vista into a low-power 'hybrid sleep' state.

Versions of Windows up to XP offer two options for low-power, fast-resume states. There is Standby or Sleep (XP uses Standby while Vista uses Sleep) and Hibernate. Standby/Sleep stores the system state in RAM and shuts down as many components as possible. Hibernate stores the system state to the hard disk and shuts down the PC. When you press the power button, Windows restores the system state from wherever it was stored (in RAM or the hard disk) and you're back to where you left it.

HYBRID SLEEP

Standby/Sleep is the fastest option, but the contents of the RAM are lost when the power is cut or a laptop's battery runs out. This can easily happen if a laptop is left in

Standby mode for a long time. Windows Vista's Hybrid Sleep mode gets around this by storing the system state in both RAM and on the hard disk. This means that should power be lost for any reason, Vista can still restore the system from the hard disk, and your work is safe.

There's virtually no difference in power consumption between a PC that has been shut down normally and one in a hybrid sleep state, assuming that they are both still connected to the mains. However, a PC can resume from a sleep state in a matter of seconds, compared to the minute or so it takes Vista to boot. By using hybrid sleep as the default off option on the Start menu, Microsoft hopes to encourage more people to use it as a fast-start alternative to leaving a PC running all the time.

Hybrid sleep is a great idea, but if you prefer a little more control over your PC's power state you can still shut down Vista in the traditional way. Click the arrow button to the right of Start menu's power button and choose the appropriate option from Restart, Sleep, Hibernate and Shut Down.

Unfortunately, Windows Vista disables the standard Hibernate option on desktop



▲ Vista's power-management features offer more scope for controlling your PC's power

PCs by default, but you can enable it manually. Open a command prompt window and type the command 'powercfg -h on' without quotes. You can find out more about this tool by visiting <http://tinyurl.com/y5w6ud>. Just bear in mind that when you use Hibernate, it uses up as much hard disk space as you have RAM in your PC.



NETWORK-ATTACHED STORAGE



NAS (in use/standby) 41W/1W
Typical cost per year £40

If you have a home network, sharing certain resources can help reduce power consumption. One shared printer will use far less power than different printers connected to multiple computers. Even using network-attached storage (NAS) can make a small difference.

A hard disk draws between 7W and 9W when idle, and up to 13W when reading data. Hard disks also generate heat that needs to be dissipated by other electrical components. If you have two or more computers that need access to lots of storage, think about installing a NAS device rather than multiple hard disks.

Running a NAS box on your network 24 hours a day, every day of the year, would cost around £40. This is the equivalent of using a laptop PC for around 40 hours a week, or owning and watching a 32in LCD TV.

HOME ENTERTAINMENT



32in LCD TV (in use/standby) 158W/3W
Typical cost per year £48

Freeview (in use/standby) 6W/4W
Typical cost per year £4.50

Sky (in use/standby) 20W/5W
Typical cost per year £8.50

Sky+ (in use/standby) 37W/20W
Typical cost per year £24.50

V+ (in use/standby) 28W/28W
Typical cost per year £27

DVD player (in use/standby) 24W/1W
Typical cost per year £5.50

Big-screen TVs and other home entertainment devices have been singled out as massive power consumers, particularly in standby mode, but the situation isn't as bleak as you might think.

A 42in plasma TV draws 305W when it's running, but this drops to just 3W in standby mode. If you watch five hours of TV each weekday, and eight hours a day at weekends, a plasma TV costs £90 a year if you leave it in standby mode when you're not watching it.

Green party Green accessories for the home

ONECLICK Intelliplug

From £17 inc VAT
From www.oneclickpower.co.uk



The Intelliplug works like a standard multi-plug adaptor, with one key difference. One socket is the 'master', and the remaining 'slave' sockets provide power only when the master socket is in use. With a PC base unit plugged into the master socket and all else plugged into the slaves, everything works normally. Turn the PC off, however, and the power to the slave sockets is cut after a short delay, thereby reducing power consumption.

BYE BYE STANDBY Bye Bye Standby

£26 inc VAT
From www.amazon.co.uk



Bye Bye Standby provides a master socket that cuts power to connected devices when they're not in use. It only provides one socket, so you must plug in a gang plug if you want to oversee more than one device. It doesn't work automatically, and you need to turn it on and off by hand with the remote control. The remote can control multiple sockets independently, so if you need to power down lots of devices with one key press, this is the way to do it.

DIY KYOTO Wattson

£150 inc VAT
From www.firebox.com



Keeping a gadget plugged into the mains just to monitor how much electricity you're using is a curious way to save power, but that's

what you do with the Wattson. With the wireless sensor clipped to your electricity meter, it monitors electricity consumption and provides a digital readout and PC-readable data. However, it's more high-tech lava lamp than serious scientific tool, and you'll cut a fiver off your annual electricity bill (not to mention save yourself £150) by not using one at all.

Power plug monitor

£9.95 inc VAT
From www.maplin.co.uk



The best way for you to assess your electricity consumption is to use a power plug monitor. This is a £10 gadget that sits between a device and the mains supply. We use a similar model for our tests, and it's accurate enough for domestic purposes. It can display power usage in a variety of units, including kWh, and you can disconnect it once you've established what your greediest gadgets are.

BETTER ENERGY SYSTEMS Solio

£50 inc VAT
From www.amazon.co.uk



Solar chargers for mobile phones are nothing new, but few are as cleverly designed as the Solio. Its folding tri-panel design makes it compact and easy to carry. The built-in battery, which can carry a charge for up to 12 months, can be topped up from the mains – handy if there isn't enough sunshine. If the weather is clement, Solio reckons about an hour of sunlight is sufficient to power an iPod for an hour, while a full charge is enough to recharge a mobile phone twice.

Switching it off properly saves just a couple of quid a year. LCD TVs are more power-efficient, with a 32in model drawing 158W when on and 3W in standby mode. At £48 a year, it costs around half as much to run as a plasma TV.

Screen brightness also plays a big part in a TV screen's power consumption. If you haven't fiddled with your TV's screen settings since the day you bought it, it's worth digging out the manual to see if you can reduce the brightness without adversely affecting image quality. You'll save money that way.

TVs are only one component in a typical home entertainment setup. Most living rooms have a set-top box of some kind. The most frugal of these is a Freeview receiver, drawing just 6W when active and 4W in standby mode. A Sky Digibox is more power-hungry, drawing 20W when active and 4W in standby mode.

With their multiple tuners and spinning hard disks, personal video recorders (PVRs) use more power. Sky+ draws 37W when active, while Virgin Media V+ draws 28W. Since they're designed to be constantly buffering a channel to the hard disk, even when they aren't recording a programme, it's hard to see how a PVR's power

consumption can be cut. Sky+ and V+ have a standby mode, but until recently this did little more than cut the output from the SCART socket and change the green power LED to red.

Sky recently issued a software update that puts its Sky+ and Sky+ HD boxes into standby mode between 11pm and 4am if the box isn't used for two hours. Standby mode was changed to turn off the fans and make the hard disk spin down, thereby reducing power consumption to 20W. The box still records shows as required, but Sky claims that putting its 184,000 Sky+ HD boxes and 2,130,000 Sky+ boxes in standby mode for 10 hours a day equates to a saving of 73,613,200kWh over a year. This is enough to light all the homes in Wolverhampton for 12 months.

The power drawn by DVD players and home cinema amplifiers varies from model to model, but amps use more power the louder they get. The standby mode in our none-too-modern Pioneer DVD-737 DVD player and Denon AVR-3802 was an impressive 1W, though, which is around 70p a year. **CS**

Next month
How to work
out your power
consumption